Prevention Of Train Collision Using GPS Based Tracking System

M N Narsaiah¹*, SuduguNikhil Reddy¹, EppalapalliKavya¹, Uppu Pavani¹, BadhaShivasai¹, C Lavanya², Namita Kaur³

¹Department of Electronics and Communication Engineering, KG Reddy College of Engineering and Technology, Hyderabad, Telangana
²Department of Civil, GRIET, Hyderabad, Telangana, India., Telangana, India.
³Lovely Professional University, Phagwara, Punjab, India.,

Abstract. The Web of Things (IoT) has numerous openings to unravel issues in standard of living. accidents are demonstrating lethal and will proceed to extend. The security of prepare travelers is considered the foremost vital thing. Programmed crisis discovery has different sensors that actuate the microcontroller when an crisis is identified. When an crisis is identified, the framework employs the Bluetooth module to send an crisis notice to the prepare driver's versatile phone and naturally sends the Worldwide Situating Framework (GPS) area of the driver's mobile phone by means of Brief Message Benefit (SMS), crisis contacts. The created alarms are too overhauled within the framework recipient module utilizing the real-time cloud-based database and open alarms. The crisis direct on the passenger's crisis side is utilized to report crises to crisis responders, which may incorporate police, fire and therapeutic work force. The thought is to utilize IoT to decrease the reaction time of crisis groups.

1 Introduction

Rail travel is now in the spotlight as it is safer, more affordable and more comfortable. In India and other countries, safety measures related to railway lines are not a big priority. Therefore, there is a need for an overhaul of railways with automatic indication of accident and fire boundary requirements. Furthermore, for the safety of visitors to Japan, a mechanized and quick response system with low quietness is necessary. When an accident occurs on the road, travelers and drivers may not be able to call for help or transport the injured as quickly as possible. They may not know the exact location of the incident, and the situation can become even worse if the provided assistance does not reach the scene quickly. To solve this problem and improve railway safety, the idea of maintaining a computer-based requirements disclosure and rapid response framework for problem resolution has been proposed. Within this framework, search devices such as collision search devices and fire detection devices are used to consistently determine comparative requirements. When a need is detected, an alert is sent using Paul's real-time database and

*Corresponding author: narsaighanethan@gmail.com.
using his GPS memory on his phone, an SMS is sent containing the type of need present and the exact GPS location of the event. Sent to the association.

A bespoke communication system has also been built to allow travelers to notify onboard road crews if the view finder fails to detect a malfunction, and in case of an emergency, alert the police, police or fire department. This allows emergency personnel to be alerted very easily and quickly. The receiving end of the module uses a Pall-based real-time database to relay clarifications and alerts about the traveler's requirements of interest. If you need to increase the time required for the release process, it is very likely that the number of passes will increase. It takes time to accept what happened. This case occurs when a victim is restrained to alert a rescue train of an accident, but due to lack of visibility at night or being moved to a completely new location, the victim There were times when it was not possible to convey the exact location to the squad. There is a great need to modernize railways through advanced innovations for the safety of travelers. Computerized demand notification for railways using smartphones and the Internet of Things is proposed to minimize the holdup rate of incoming delivery services and reduce the number of level crossings due to backlogs of assistance.

There are several frameworks based on the Mechanized Failure Alert Framework, which uses a feature tracking device and if an SMS is not replaced due to an error, an alert is sent to the Collector module in Firebase real-time. More accurate and effective. The database will be sent to seduce you with your phone and GPS location to further optimize your request type. Chain pulley systems provided on trains are not always feasible, accurate, do not guarantee victory, and various disappointments have also been reported. Simply pulling the chain does not inform staff of the exact requirements, which delays meeting the exact requirements. To solve this problem, the main advantage of this request system is to update the communication system on the passenger side, and use the communication system on the receiver side to notify that the train will stop through the communication system on the passenger side. and be able to call other trains. Recruit employees for specific purposes. Therefore, passengers will feel more secure while traveling by train and will have a hassle-free and safe journey.

2 Problem Statement

Train collisions represent a consummate safety concern in the road assiduity. These collisions can do due to a myriad of reasons, ranging from conking signals and incorrect track switching to setbacks in mortal judgment. Similar incidents have ruinous consequences, including the loss of lives, injuries to passengers and crew, and expansive damage to road structure. The mortal and profitable risk of train collisions is substantial. Lives are irrevocably altered, and communities are left scuffling with the fate of these woeful events. Also, the fiscal impact is significant, encompassing the costs of medical care, insurance claims, legal proceedings, and the form or relief of damaged road means likewise, train collisions disrupt the smooth inflow of rail transportation networks, leading to detainments, increased operating charges, and a negative ripple effect on diligence counting on timely and effective rail services. This dislocation can have cascading consequences throughout the broader frugality, affecting the movement of goods and coffers critical to colourful sectors.

The being safety mechanisms, while precious, may not beunerring in precluding train collisions. Therefore, the problemstatementunderscores the urgency of designing and enforcing a state-of-the-art train collision avoidance system. Such a system must work
slice-edge technologies, including detectors, artificial intelligence, and prophetic analytics, to proactively descry and alleviate collision pitfalls. It should also incorporate real-time communication and data-participating protocols among trains, signaling systems, and control centers to ensure timely intervention and collaboration. The need for a comprehensive train collision avoidance system is irrefutable. This system isn’t only vital for conserving lives and guarding the well-being of individualities within and around the road ecosystem but also for securing the profitable interests and stability of diligence reliant on rail transportation. It represents a critical step towards achieving safer, more effective, and more dependable road operations while minimizing the ruinous impacts of train collisions.

3 Literature Survey

To begin with, in arranging to get it the request and some time recently outfitting our claim result in profundity, we got to initially get it the being investigation and work drained the field. thus, in this area a various distinctive investigation papers were dug to accumulate pertinent data approximately the plan. Ishan Jain, Shubham Malik and Soumya Agrawal [1] have created Programmed Railroad Obstruction Framework, Railroad Following and Collision Shirking Utilizing IOT. A framework where sets of infrared finders are utilized to track the position of the prepare and its heading.

Lisi-hui, Cai Bai-weapon, Liu Jiang and Wang Jain [2] developed a collision early warning system based on the collision risk monitoring requirement. The time to avoid a collision depends on the time of the accident, such as the stability of long-distance communications, the reaction of the driver, the safe distance and the level of obstacles. Considering this time frame, the time to avoid the collision can be calculated.

N. Pavithra, K. Tamil Selvi and M. Kowsalya [3] proposed a framework for railway track inspection and accident prevention. The proposed framework is a better design for protest using Arduino microcontroller, ultrasonic detector and radar module. The radar is separated from the object, and the ultrasonic detector is protected to avoid accidents due to collisions between objects.

Aamir Ahamed, Rubel Ahamed, Sayed Hossen and Naeemul Islam [4] have created Prepare Collision Evasion Utilizing GPS and GSM Module. This framework combines with PIC16F877A microcontroller, ultrasonic locator and GPS and GSM. The ultrasonic finder which is connived with the microcontroller is utilized to descry the handicap. GPS is utilized to identify the prepare after being ceased by recognizing impediments. This topographical position is transferring to the control unit by utilizing GSM.

Yuan Cao, Jiakun Wen, and Lianchuan Ma [5] developed a virtual collision avoidance and follower scheduling control framework. A controller based on general display predictions and hybrid pseudo-terrain perception is used for cooperative control on virtual connected trains and collision prevention.

T. Priyadharshini, M. Saranya and S. Swathi [6] created Prepare Collision Evasion and Split Discovery Utilizing GPS and GSM Module. The Zigbee will scent the unequally coming prepare and exchange the information to the opposite prepare. The ultrasonic finder will scent the break and cautions the engine driver and halt the prepare consequently. The Zigbee is installed within the front of the prepare. On the off chance that both the trains are on the same track both Zigbee finders scent the same flag from opposite trains too it naturally applies a break and stops the prepare at a certain separate. The ultrasonic locator
which is schemed with the microcontroller is utilized to descry the handicap. GPS is utilized to identify the prepare after being halted by identifying impediments. This topographical position is exchanged to the control unit by utilizing GSM.

Tune Li, Hongli Zhao, and Jinmin Ma [7] developed the Edge Prepare Cripple Revelation software framework based on YOLOv3. YOLOv3 is considered a proof-of-concept because it can compare the speed and accuracy of implementing a protest demonstration compared to two control models. To store software libraries and implement ready-to-use interfaces, we propose a partitioned framework based on the YOLOv3 model.

Hari Kumar Naidu and Shabaz Anwaz [8] developed “Disaster preparedness” using MEMS framework based on Fluffy technique. The boscage-ready frame uses a vacuum to create a bushing if the operator drops a dead or ground object onto the track. Through a vision detector installed in the driver's cab, a smart input is given to the box frame so that the driver can open the box. Boscacci's post-surgery preparations continued to have serious complications. The impact of the crash is captured by a small electronic projectile that fires mechanical air pockets to capture the deadly protest.

4 Methodology

![Block diagram of Train Collision Avoidance System](image)

It represents our proposed anti-collision system (ACS) working processes. There's an Ultrasound device which always check handicap in front of the train and measured distance from detector end to track. If there's no handicap also it'll show green signal and display track concurrence communication. If handicap is detected also it will warning with buzzer and red signal and display handicap distance from the train. In this Anti-Collision Device (ACD) there is a switch to elect automatic or homemade mode. If an automatic mode is
spark also the exigency boscage active automatically and control the train. On the other hand, if the homemade mode is active also it'll descry an handicap and advise to responsible loco airman to spark the boscage for control the train manually.

4.1 Description of components

4.1.1 Arduino:

Arduino Uno is a board based on ATmega328 (datasheet). It has 14 computer/utility input pins (6 of which can be used for PWM operation), 6 analog inputs, 16 MHz ceramic resonator, a USB interface, a power jack, an ICSP header, and a reset button. It includes everything you need to support a microcontroller; It means connecting to your computer via a USB cable or running it to boot using an AC-DC device or battery. The Uno is different from all previous papers in that it does not use a USB FTDI to motor chip. For example, it may feature a modified Atmega16U2 (a version of the Atmega8U2 in R2) as a USB-to-journaling machine. Uno's update 2 board has a compromise that pulls the 8U2 HWB line to the base, making it easier to enter DFU mode.

4.1.2 Power supply:

The input to the circuit is connected to a controlled control condition. The AC input voltage, 230V from the mains, is regulated by the motor to 12V and supplied to the process. The project carried out by the process may be DC voltage. To generate the appropriate DC voltage, the output voltage from the treatment is amplified to the slime and the AC component that appears after correction is removed. This voltage is fed into a voltage regulator to produce a pure DC voltage.

4.1.3 Liquid Crystal Display (LCD):

Liquid crystal displays, also known as LCDs, help provide a user interface as well as debugging programs. Commonly used LCDs appear to be on Hitachi's HD44780 controller or other HD44580-compatible controllers. The most commonly used LCDs on the market today are 1 line, 2 line, or 4 line LCD, with only 1 controller and support up to 80 characters, LCDs that support the more than 80 characters using 2 HD44780 controllers.

4.1.4 Global Positioning System (GPS):

GPS satellites broadcast shafts in two carrier frequentness; L1(1,575.42 MHz) and L2(1,227.60 MHz). shafts that can be available to the common open are decoded in C/ A (Coarse/ Securing) law, and the shafts that can be utilized as it were by the US military drive are decoded in P (Exact) law. C/ A law comprises of distinguishing proof canons of each partisan and is broadcast alongside route dispatches. The information of the course of eachdisciple is called the ephemeris, and the information of course of all adj. is called the florilegium. The route dispatches are broadcast at a rate of 50 bits per moment. working out this collection of information, GPS collector calculates remove between satellites and the recipient in arrange to actuate position data.
4.1.5 Buzzer:

Ordinary employments of buzzers and beepers incorporate caution predisposition, clocks and substantiation of client input practically equivalent to as a mouse tap or urgent stroke. Buzzer is an coordinates structure of electronic transducers, DC control drive significantly utilized in computers, printers, copiers, exhortations, electronic toys, car electronic furnish, phones, clocks and other electronic items for sound predisposition. Dynamic buzzer 5V Evaluated control can be specifically associated to a nonstop sound, this area given sensor development module and the board in combination, can total a basic circuit plan, to" plug and play."

5 Result

![Components of train collision avoidance system](image)

Components that are used to prevent train colloidion and to track the train.
Fig. 3. LCD Display

If any object is detected, then the message will display in LCD.

Fig. 4. Object detection using ultrasonic sensor

In the above figure, we can see that the ultrasonic sensor detects objects. Then it will display in LCD and a buzzer produces a warning. GPS and GSM will send a message to the control room, and Loco Pilot will share the location with them.
5 Conclusion

We have outlined and executed our venture effectively. This innovation has the early detecting of mishaps and in this manner it can dodge mischances and guarantees security. After completing the extend in spite of the fact that we watch few restrictions such as the framework can be influenced by terrible climate such as rain, storm etc. since as the ultrasonic sensor employments the sound wave and the speed of sound changes with the stickiness of the discuss. As a result identifying protest might take a few more additional time which can be exorbitant but it has a few focal points such as the prepare can be found from the SMS sent by GSM saying geological position of the prepare by GPS and the prepare stops naturally after identifying impediments and the driver comes up short to stops the prepare some time recently entering into threat area.

References

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